REMARKS

Claims 1-7, and 13-24 are all the claims presently pending in the application. Claims 1-2, 13, and 16- 20 are amended to more clearly define the invention. Claims 1 and 13 are independent.

Applicants thank Examiner Ton for the courtesies extended to the Applicants' representative during a personal interview on July 12, 2004. During the personal interview, Examiner Ton agreed that the above-amendments overcome the applied reference rejection.

These amendments are made only to more particularly point out the invention for the Examiner and not for narrowing the scope of the claims or for any reason related to a statutory requirement for patentability.

Applicants also note that, notwithstanding any claim amendments herein or later during prosecution, Applicants' intent is to encompass equivalents of all claim elements.

Entry of this §1.116 Amendment is proper. Since the Amendments above narrow the issues for appeal and since such features and their distinctions over the prior art of record were discussed earlier, such amendments do not raise a new issue requiring a further search and/or consideration by the Examiner. As such, entry of this Amendment is believed proper and Applicants earnestly solicits entry. No new matter has been added.

Claims 1-7 and 13-24 stand rejected under 35 U.S.C. § 102(e) as being anticipated by the Munakata reference.

This rejection is respectfully traversed in the following discussion.

I. THE CLAIMED INVENTION

A first exemplary embodiment of the claimed invention, as defined, for example, by independent claim 1, is directed to an active-matrix addressed reflective liquid crystal display that includes a first substrate that is transparent, a second substrate, a lower insulation film formed on the second substrate, a plurality of switching elements, respectively provided for each pixel, an insulation layer having a surface irregularly configured, a reflection film formed on the insulation layer and having an irregularly configured surface depending on the irregular surface of the insulation layer, a liquid crystal layer provided between the first substrate and the reflection film, an upper electrode between the insulation layer and the lower insulation film, the upper electrode being provided for each pixel and located in a region wherein the reflection film is provided, the upper electrode being electrically coupled to a source electrode of the switching element, and a lower electrode provided between the second substrate and the lower insulation film. The lower electrode forms a storage capacitor with the upper electrode.

Further, the irregularly configured surface of the insulation layer includes a plurality of substantially linear projections, and a plurality of recesses surrounded by the substantially linear projections.

A second exemplary embodiment of the claimed invention, as defined, for example, by independent claim 13, is directed to an active matrix addressed reflective liquid crystal display that includes a first substrate, a lower electrode over the first substrate, a lower insulation film over the lower electrode, an upper electrode over the lower insulation film to form a storage capacitor with the lower electrode, an insulation layer over the upper electrode and having an

irregular surface, a reflective electrode over the insulation layer and having an irregular surface that corresponds to the irregular surface of the insulation layer, a switching element on the first substrate having a source electrode electrically coupled to the upper electrode, a second substrate above the reflective electrode, and liquid crystal material between the reflective electrode and the second substrate.

Further, the irregular surface of the insulation layer includes a plurality of substantially linear projections

Conventional reflective liquid crystal displays are produced by applying a photosensitive insulation layer 28 (Fig. 2E) that is exposed to light in a photolithography process to form projections 29 (Fig. 2F). However, the amount of time that is required to expose the photosensitive insulation layer 28 is lengthy, which renders the fabrication process complicated and which undesirably increases the time for the overall fabrication of the display.

Further, the storage capacitance for each pixel in these conventional displays is small, and, thus, the display is susceptible to flicker. One attempt to address this problem has involved increasing the overlap between the gate line areas and the reflective electrodes (pixel electrodes). However, even with this modification, the thickness of the first insulation layer 10 and the second insulation layer 11 (Fig. 1) is too thick to enable a sufficient storage capacitance.

Additionally, the projections 29 (Fig. 2G) are independently formed on the gate insulation layer. Therefore, the projections 29 are liable to be peeled off from the gate insulation layer 22 during subsequent processing.

In stark contrast, the present invention provides an upper electrode that is below the first

insulation layer. In this manner, since a photoresist with a low sensitivity may be used for the first insulation layer, since the upper electrode is below the first insulation layer, when the first insulation layer is patterned, the light that has passed through the first insulation layer is reflected by the upper electrode and directed back to the insulation layer. This feature allows a reduction in the amount of light that is required to expose the photoresist when forming the first insulation layer (page 8, lines 19-28).

Further, the present invention includes an insulation layer that has an irregular surface that includes a plurality of substantially linear projections. An exemplary embodiments of these linear projections are illustrated very clearly by Figure 4A of the present application. This feature is in stark contrast to the conventional projections which are non-linear projections and which are prone to peeling off of the underlying layer. In this manner, the present invention attains excellent adhesion of the patterned insulation layer against the passivation film, thereby eliminating or substantially reducing peel-off of the patterned insulation layer from the passivation film. (Page, 10, lines 12-17).

Additionally, this Amendment amends claims 2 and 17 to recite the feature that the linear projections extend substantially parallel to the surface on which the projections are formed. This feature further clarifies the distinction over projections that are columnar in shape where the axes of these columnar shapes "linearly" extend in a direction that is substantially perpendicular direction from the surface on which these projections are formed.

II. THE PRIOR ART REJECTION

The Examiner alleges that the Munakata reference teaches the claimed invention. Applicants submit, however, that there are elements of the claimed invention which are neither taught nor suggested by the Munakata reference.

As explained by the Applicants' representative during the personal interview on July 12, 2004, the Munakata reference does not teach or suggest the features of the present invention including: an upper electrode between said insulation layer and said lower insulation (claim 1); and a reflective electrode over the insulation layer that is over the upper electrode (claim 13). As explained above, these features are important for allowing a reduction in the amount of light that is required to expose the photoresist when forming the first insulation layer.

The Office Action alleges that the pixel electrode 11 that is disclosed by the Munakata reference corresponds to the claimed upper electrode of a storage capacitor and that the storage capacitor Cs that is disclosed by the Munakata reference corresponds to the claimed lower electrode of a storage capacitor, that the resin film 9a that is disclosed by the Munakata reference corresponds to the claimed insulation layer, that the interlayer insulation films 20b and 20a that are disclosed by the Munakata reference corresponds to the claimed lower insulation film, and that the metal film 9b that is disclosed by the Munakata reference corresponds to the claimed reflective electrode.

However, the pixel electrode 11 is not between the resin film 9a and the interlayer insulation films 20a and 20b.

Therefore, the Munakata reference does not teach or suggest the feature of an upper

electrode between said insulation layer and said lower insulation as recited by independent claim 1.

Further, although the metal film 9b is over the resin film 9a, the resin film 9a is not over the pixel electrode 11.

Therefore, the Munakata reference does not teach or suggest the feature of a reflective electrode over the insulation layer that is over the upper electrode as recited by independent claim 13.

However, contrary to the Office Action's allegation, the pixel electrode 11 that is disclosed by the Munakata reference corresponds to the upper electrode that is recited by the independent claims.

Additionally, as agree by Examiner Ton during the July 12, 2004, personal interview, the Munakata reference does not teach or suggest the feature of linear projections. Rather, the Munakata reference merely discloses that "The resin film 9a is formed to have an irregular surface." (Col. 4, line 64) and that "the resin film 9a is patterned to have discrete columnar shapes." (Col. 7, lines 33-34) as illustrated by Figure 2C.

Clearly, the longitudinal axes of these "columnar shapes" are normal to the surface of the interlayer insulating film 20. These "columnar shapes" are the same type of projections that are illustrated by Figure 2F of the present specification.

In stark contrast, an exemplary embodiment of the invention provides linear projections 94 which are illustrated by Fig 4A of the present specification. These linear projections are important for providing excellent adhesiveness of the patterned insulation layer 66 against the

passivation film, thereby eliminating or reducing the risk of peel-off of the patterned insulation layer 66 (page 10, lines 14-17).

The Examiner's "Response to Arguments"

The Office Action alleges that a storage capacitor is "inherently formed" between "the pixel electrode electrically coupled with (9b,18), and insulation film 17, and a lower electrode 18."

First, contrary to the Office Action's allegation, it is impossible to form a storage electrode using electrodes that are not insulated from each other. As is clearly shown by Fig. 1A, the pixel electrode 11 is electrically connected to the semiconductor film 18. The pixel electrode 11 is electrically connected to the intermediate electrode 12a, which in turn is electrically connected to the metal film 9b, which is electrically connected to the drain electrode 22, which is in direct contact with the semiconductor film 18.

The Office Action cannot seriously contend that a capacitor can be provided between the pixel electrode 11 and the semiconductor film 18 when they are electrically connected to each other.

Second, the Office Action is not being consistent in the allegations with respect to which particular portions that are disclosed by the Munakata reference correspond to the claimed features.

Thus, the Office Action's rejection fails to comply with 37 C.F.R. §1.104(c)(2) which requires that "the particular part relied on must be designated as nearly as practicable. The pertinence of each reference, if not apparent, must be clearly explained and each rejected claim

specified."

In this case, the Office Action alleges that the storage capacitor Cs corresponds to the claimed lower electrode on page 2 of the Examiner's Office Action and contradicts that allegation by alleging that the semiconductor film 18 corresponds to the claimed lower electrode.

The Office Action alleges that claims have not defined "linear projections." Therefore, in accordance with the Office Action's suggestion, this amendment amends claims 2 and 17 to clarify that the linear projections extend substantially parallel to the surface of the substrate.

Lastly, the Munakata reference is not even concerned with addressing the same problems that are solved by the present invention.

Indeed, the display that is disclosed by the Munakata reference is subject to the same problems that are solved by the present invention.

As is clearly illustrated by Figures 2B and 2C of the Munakata reference, there is no reflective surface below the photosensitive film 9a. Therefore, the amount of time that is required to expose the photosensitive film 9a of Fig. 2B is lengthy, which renders the fabrication process complicated and which undesirably increases the time for the overall fabrication of the display.

This problem is not addressed, nor even discussed by the Munakata reference.

In stark contrast, the present invention provides an upper electrode below the insulation layer which reflects the exposing light and reduces the amount of time that is required for the photolithographic process.

Therefore, the Examiner is respectfully requested to withdraw this rejection of claims 1-7 and 13-24.

III. FORMAL MATTERS AND CONCLUSION

In view of the foregoing amendments and remarks, and the agreement reached during the July 12, 2004, personal interview, Applicants respectfully submit that claims 1-7 and 13-24, all the claims presently pending in the Application, are patentably distinct over the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

Should the Examiner find the Application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary in a telephonic or personal interview.

The Commissioner is hereby authorized to charge any deficiency in fees or to credit any overpayment in fees to Attorney's Deposit Account No. 50-0481.

Respectfully Submitted,

Date: 7/13/04

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CERTIFICATION OF FACSIMILE TRANSMISSION

I hereby certify that I am filing this Amendment by facsimile with the United States Patent and Trademark Office to Examiner Minh Toan T. Ton, Group Art Unit 2871 at fax number (703) 872-9306 this 13th day of July, 2004.

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